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Natural Disasters and Management Systems of Bangladesh from 1972 to 2017: Special Focus on Flood

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Abstract

Bangladesh is one of the disaster prone areas of South Asia as well in the world, because of its geographical characteristics, complex topographical features, mighty rivers system, monsoon climate and the coastal morphology. Since 1972 the country has experienced total 297 natural disasters. Of them flood and storm are common disasters which represents 47.47%and 28.96% respectively of the total disasters. More or less each and every year Bangladesh has been experiencing the disaster flood and since 1972 total 86 floods occurred in Bangladesh which killed total 42279 people. But it's a good news that the trend of deaths by this disaster have been decreasing because the Government of Bangladesh have taken different steps such as flood action plan, flood management model study, flood hydrology study, flood forecasting and warning study, national water policy, national water management plan, irrigation and drainage projects, construction of flood embankments and flood shelters. For the overall natural disaster management the country has institutional and regulative framework, which is monitored and implemented by different ministries and departments collaborating with different national and international organizations.

Keyword: *Disaster, flood, floodplain, vulnerability, trend, management, framework*

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INTRODUCTION

Bangladesh is officially known as the Peoples Republic of Bangladesh located in the northeastern part of South Asia. Bangladesh occupies an area of 147,570 square kilometers [1]. It is surrounded by land borders of India in west, north, and east and a small land border with Myanmar in the southeast and divided across Naf River. The southern coastline of Bangladesh is on the Bay of Bengal. The neighboring countries of Bangladesh are Nepal, Bhutan, and China but sharing no land borders with it. The topographical feature of Bangladesh consists of alluvial soil with flat, low land. But the districts Khagrachari, Rangamati, Bandarban under the Chittagong division are extensively hilly which are all together known as Chittagong Hill Tracts. Bangladesh is the largest delta of the world, comprise with three large rivers Ganges–Brahmaputra–Meghna. There is lot of small rivers criss-cross all over the country under these three large rivers. Bangladesh is one of the most vulnerable countries of the world in terms of natural and anthropogenic hazards [2]. Bangladesh is highly vulnerable to natural disasters because of its geographical location, land features, excessive rivers, monsoon climate and the coastal morphology [3]. Thus, the geographical settings, meteorological characteristics and hydrological conditions are the contributing factors that make the country more vulnerable to different geo-hazards and hydro-meteorological hazards [2]. Two more common natural disasters of Bangladesh are flood and cyclone, because it's a low-lying riverine country. Other natural disasters that also occur in Bangladesh are landslide, drought, tidal surge, tornadoes, earthquake, river erosion, etc.

OBJECTIVES OF THE STUDY

The general objective of the study is to given the overview of the natural disasters of the country and its management, which happened during the last 46 years (1972–2017). The general objective focuses on the following specific objectives:

(i) To study about the most significant natural disasters in Bangladesh.

(ii) To find out the effects of these disasters on people's lives, health and economy.
(iii) To study in details about the disaster 'flood' and its management.
(iv) To study about the emergency response and disaster management systems of the country.

METHODOLOGY AND DATA SOURCES

The paper has been made through utilizing the secondary data and by reviewing literatures from different sources.

For the analysis purposes, the Emergency Database (EM-DAT) of the Centre for Research on the Epidemiology of Disasters (CRED) has been used as a secondary data source. Additionally, different national organization's surveys, reports and guidelines are also utilized as a key source of information for disaster analysis and management. The organizations are the ministries, department or NGO; such as Ministry of Disaster Management and Reliefs (MoDMR), Department of Disaster Management (DDM), Cyclone Preparedness Project (CPP), Bangladesh Asiatic Society, Bangladesh Bureau of Statistics (BBS) and World Bank. Important map and information about disasters are also obtained from exploring the reports, journals, manual, guidelines, publications and facts sheet of international organizations such as UN, OCHA, UNISDR, UNFP, WHO, ADRC, Prevention Web, and Google websites.

ANALYSIS AND DISCUSSION

Natural Disasters in Bangladesh

Bangladesh is the developing country of South Asia. People of the developing counties like Bangladesh are at higher risk to natural hazard than that of developed countries, not only because of greater hazard frequency but also because of greater vulnerability [4]. Bangladesh currently is in a leading position as the world's most disaster prone country, because of its geographical location, meteorological properties, excessive rivers, over and densely population, poor information and lack of adequate risk management.

Bangladesh has a long history of natural disasters [5]. After the independence on 16 December 1971, in 1972 the new country got the experience of flood and storm. The trend of disaster is upward till now. Even in 2017, Bangladesh experienced natural disasters flood, landslide and storm. From 1972 to 2017, during these 46 years, Bangladesh experienced total 297 natural disasters [6].

Frequency Distribution of Natural Disasters in Bangladesh

From the record of EM-DAT (CRED) and on the basis of their criteria for disaster, it was found that since 1972 somehow every year natural disaster happened in Bangladesh. It is interesting and a matter of thought that same types of natural disasters happened frequently in Bangladesh. Of them storm (tropical & convective), flood and epidemics are frequent.

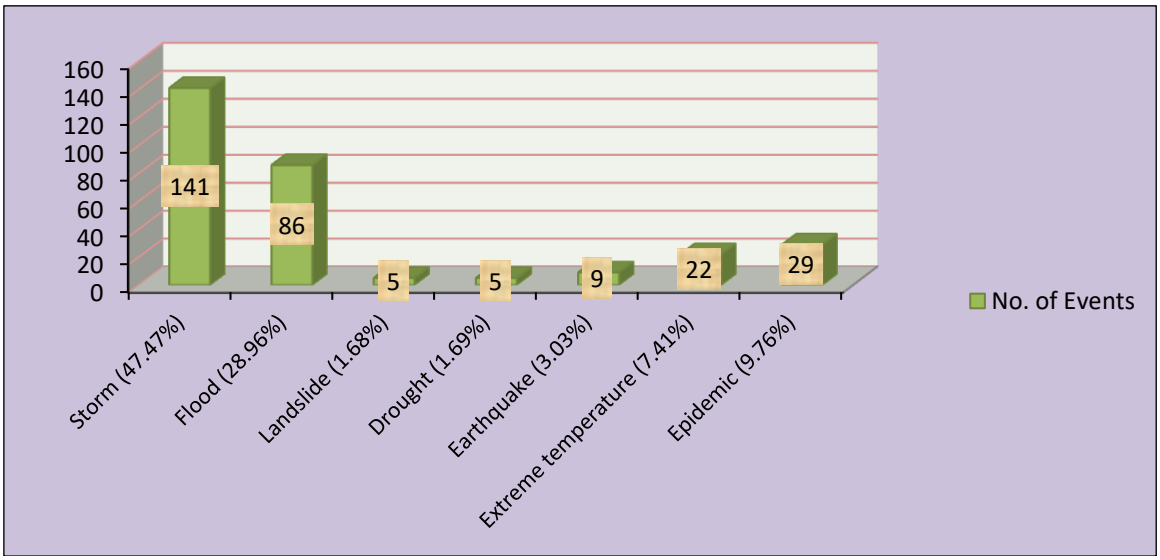

Fig. 1: *Frequency of Natural Disaster in Bangladesh since 1972. (EM-DAT/CRED).*

From Figure 1, it has been seen that storm occurred 141 times and covered about 47 percent of the total disasters during the given period. The next frequently occurred natural disaster is flood and it liable for 29 percent of all natural disasters. Among all natural disasters landslides and droughts are less frequent. Geophysical disaster earthquake and climatological disaster extreme temperature happened 9 times and 22 times respectively [6].

Overall Impacts of Natural Disasters

People, infrastructure, environments are vulnerable to disasters, especially to flood and storm (cyclone). For the impacts of the disasters, the country always in a distress [7]. Disasters not only responsible for death of large number of people but also affect country's economy and health.

Table 1 reported that since 1972, 229521 people have died, 396316766 have been affected and economic damaged was 19067901 ('000 US$) due to natural disasters. It also found that majority of the people have died and affected due to flood and storm. Lion share of the economic losses were reported due to flood and storm.

Study of Flood in Bangladesh

Flood is the most universal of the natural hazards and most of the remarkable floods of the globe are associated with the world's great rivers. Generally flood can be defined as an overflow of a large amount of water beyond its normal limits, especially over the land that is normally dry. Flooding is the natural characteristics of the rivers. So flood also can be defined as comparatively high flow of water that overflow the natural or artificial banks in any of the reaches of a stream [4]. When the banks of the rivers are overtopped, water spreads over the floodplain and generally causes huge problems for crops, vegetation and inhabitants. In Bangladesh, the definition of flood is little bit different. In the rainy season when the water flow exceeds the holding capacity of rivers and low-lying areas it swamps the whole area causing damage to vegetables, crops, home, roads, bridge and other properties.

In Bangladesh, flood can be categorized as Monsoon flood, Flash flood and Tidal/Coastal flood. In Table 2 this classification is given with the characteristics of different types of floods.

Floodplains in Bangladesh

On the basis of physiographic characteristics, Bangladesh can be classified into three well-defined regions; (i) Floodplain, (ii) Terrace, and (iii) Hill areas. Of them, floodplain is a very important type of landscape of the country because people have long been attached to these floodplains for the agriculture, industry and culture. Out of total area, 80% of Bangladesh is floodplain [8]. Floodplain is the almost flat area that borders the rivers, especially large complex system of converging river in a low land region. It can also be defined as relatively smooth valley floors adjacent to and formed by alleviating rivers, which are subject to overflow [4].

Table 1: *Impacts of Natural Disasters on Bangladesh Since 1972 (EM-DAT).*

Disaster Type	Total Deaths	Total Affected
Flood	42279	304256323
Storm	174288	63445949
Epidemic	10188	3042429
Landslide	263	136470
Extreme Temperature	2440	414200
Earthquake	45	19395
Drought	18	25002000
Total	**229521**	**396316766**

Table 2: *Categories of Floods in Bangladesh with their Characteristics.*

Categories of the flood	Characteristics
Monsoon flood	It is seasonal, increases slowly and decreases slowly, inundates vast areas and causes huge losses to life and property.
Flash flood	In this case water increases and decreases suddenly, generally happen in the valleys of the hilly areas.
Tidal flood/ coastal flood	It last for short duration, height is generally 3m to 6m, blocks inland flood drainage

There are 18 sub units of Floodplain in Bangladesh includes Old Himalayan Piedmont Plain, Tista Floodplain, Old Brahmaputra Floodplain, Jamuna (Young Brahmaputra) Floodplain, Haor Basin, Surma–Kushiyara Floodplain, Meghna Floodplain; Ganges River Floodplain, Ganges Tidal Floodplain, the Sundarbans, Lower Atrai Basin, Arial Beel, Gopalganj–Khulna Peat Basin, Chittagong Coastal Plain, and Northern and Eastern Piedmont Plain. Again, Meghna floodplain consists of four sub units as Middle Meghna Floodplain, Lower Meghna Floodplain, Old Meghna Estuarine Floodplain, and Young Meghna Estuarine Floodplain.

Frequency of Flood in Bangladesh

Flood is an annual natural phenomenon of Bangladesh. Every year in any part of the country is overwhelmed by flood. Since 1972, Bangladesh has experienced total 86 disasters flood [6].

From Figure 2, it can be seen that Bangladesh experienced highest number of riverine flood (46 times) between from 1972 to 2017. Flash flood and other types of flood also occurred frequently.

Historical Events and Impacts

In Bangladesh, floods are more or less a recurring phenomenon and most of them are within endurable limits. But sometimes they become devastating. In Bangladesh, each year about 26,000 sq km, 30% of the country is flooded, but may be up to 70% in the severe years [9]. Since 1972, each year Bangladesh has experienced the event flood. Even on 28 September 2017, Bangladesh experienced devastating flood, which killed 145 people, 8 million people have been affected across 32 districts, destroyed 103,855 houses, and damaged 4,636 education infrastructures [10].

From Table 3, it can be easily demonstrated that flood is one of the most devastating disaster in Bangladesh. During last 4 decades Bangladesh experienced total 86 floods and 42279 people have perished (Table 3). But the severity of all floods was not equal.

From the trend line of Figure 3, it has been found that the number of death has been decreasing by the floods during 1972 to 2017.

Causes of Flood in Bangladesh

In the north region of Bangladesh, there are large areas of shallow flooding interspersed with more deeply flooded pockets in meander scars and old flood basins [4]. In the northern and eastern areas of the country flooding is caused by drainage congestion which exists everywhere except in the highland hilly territory (Figure 4).

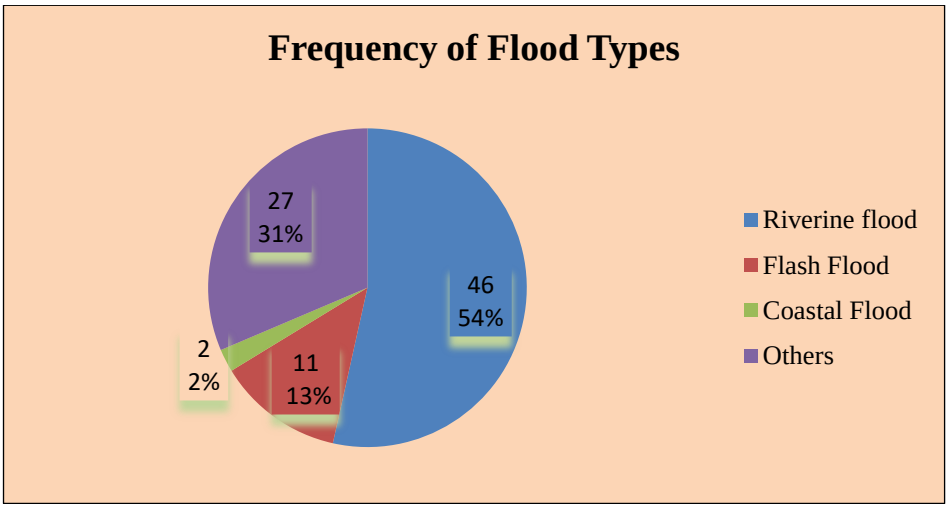

Fig. 2: *Frequency of Flood in Bangladesh on the Basis of their Types (EM-DAT/CRED).*

Table 3: *Total Impacts of Flood Since 1972 (EM-DAT/CRED).*

Total Event	Total Deaths	Total Affected	Total Area Affected (km^2)
86	42279	396316766	747230.11

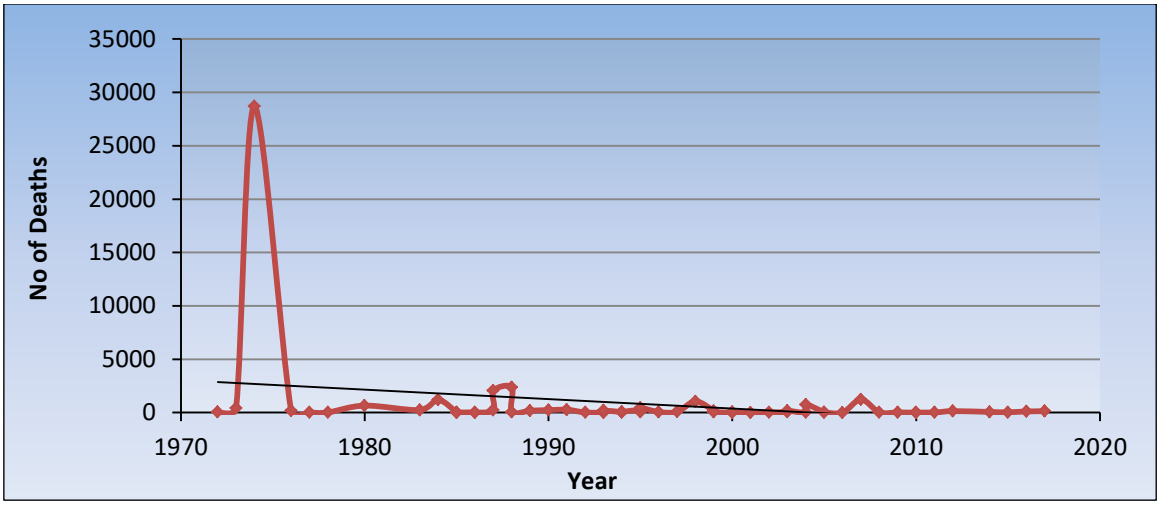

Fig. 3: *Trend of Affected Population due to Disasters (1972–2017).*

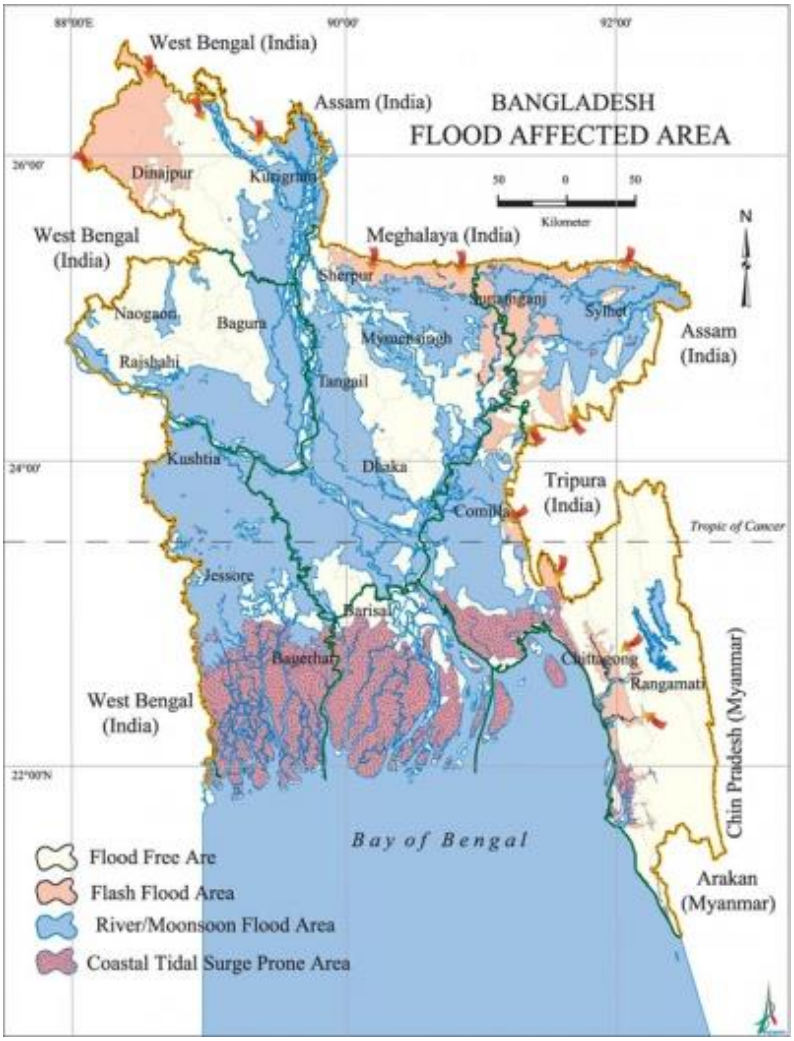

Fig. 4: *Flood Affected Area of Bangladesh. Source: Banglapedia.*

From Figure 4 it is also seen that the south part of the country, a highland and hilly area separates the Ganges from the deep flood basin in Chalan Beel and in the northwest region east all the monsoon drainage of the Atrai River and south of the Tista river passes through the flood basin to the Brahmaputra [4]. The northeast and southeast regions are

characterized by flash floods because of hill catchment drainage. Majority of the south-central and southwest regions, flooding is mainly associated with poor drainage, tidal and storm surges. The northern half of the south-central areas of the country is the principal floodplain of the Padma and Lower Meghna, and the southern half is the chief network of estuary channels which is liable to distribute about 40% of the Lower Meghna flow to the sea [4]. In the southwest region, the drainage system silted ex distributaries of the Ganges connected to the sea by a largely Moribund Delta which creates extensive shallow flooding.

The main cause of flood in Bangladesh is excessive rainfall in the catchment areas of the rivers. The monsoon belt with the Himalayas in the North Bangladesh makes the region of heavy rainfall. Approximately 80% of the rainfall occurs during the 5 month period from May to September. About 90% of the water carried by our main river system, the Brahmaputra-Jamuna, the Ganges, the Meghna and other smaller rivers is brought from outside the country. The magnitude of the flood depends on the how much of excess water that is generated. Though the primary cause of flood is heavy rainfall in the catchment area of the rivers, there are some other factors which may aggravate the floods are (i) general low topography of the country with major rivers draining through Bangladesh including a congested river network system, (ii) rainfall in the upstream country or in the mainland, (iii) snow-melt in the Himalayas, (iv) river siltation or landslides that reduces the carrying capacity of the rivers and aggravate the flood, (vi) human intervention of the environment such as deforestation in the catchment area that accelerate the downstream water flow, (vii) slowing down of the river outflow by tidal and storm, (viii) construction of barrages and protective works along the banks of the river and (ix) tectonic anomalies those change the river flow or morphology.

Exposure and Vulnerability

Flood is very common hazard in Bangladesh and the country is always in a risk of this natural phenomena. According to the INFORM risk index of Bangladesh the flood is the only hazard which obtained score 10 out of 10. So it can be easily said that the country is high risk in flood. In a broad sense the country is vulnerable to this hazard because of the world's mightiest river systems, river bank erosion, low elevation from the sea, global warming and climate change, dominance of floodplain and a growing and densely population. Most of the people in coastal and rural areas of Bangladesh are in poverty line. They build their house in risk areas not only for lack of land but also for agricultural purpose. The riverside land is fertile with alluvial soil and this led people to develop farming and agricultural industry. But the economic development in the rural areas is largely hampered, as every year the people lose their property and livelihood because of flood. The agricultural and food sector has been suffering and vulnerable to floods. After floods farmers suffer from acute shortage of seeds and sapling. The flood becomes disastrous due to climate change, bad urbanization, unplanned growth of settlements in flood-prone areas, weak construction and overreliance on flood control works such as levees and reservoirs [9]. Delayed warning and evacuation, lack of information to the public, rejection of the population to be evacuated and inadequate temporary shelter make the flood more disastrous. Women, elder people (age over 60) and children are more vulnerable to the disaster flood because of their lack of physical capacity to the torrent browse. Drowning is the biggest killer in the floods. Flood create deadlock situation in communication system, educational institution and official organizations. After floods, outbreaks of different types of disease are very common such as diarrhea, skin disease, eye infection, etc.

Flood Management System of Bangladesh

Flood Management Measures

Flood Management measures are aimed at reduction of damage and harmful effects, and creation of an environment for enhanced economic activity [11]. There are two options for flood management measure such as (i) structural measures regarded as the control of physical process of flooding and protection of the vulnerable area up-to minimum level of flooding by engineers and local people

introducing dam, embankment, dyke, polder, levee, etc., and (ii) Non-structural measures regarded as reduction of loss or damage by social scientists and conservationist introducing flood forecasting and warning, flood fighting, evacuation and shelter management, flood insurance, floodplain zoning, changes in cropping pattern, etc. [11]. The integration of these measures is prerequisite for effective disaster management. To deal with floods the GoB has been developing and implementing various measures in the country with better equipments such as flood action plan, flood management model study, flood hydrology study, flood early warning study, national water policy national water management plan, and construction of flood embankments and flood shelters [9].

Flood Action Plan (FAP)

In 1987 and 1988, the country experienced two disastrous floods. A multi-dimensional flood study—Flood Action Plan (FAP) initiated based on several earlier studies by UNDP, a French Engineering consortium, USAID and JICA (Japan International Cooperation Agency) and it received much attention from the donors as the flood of 1988 is one of the most disastrous flood in the history of Bangladesh [4]. As the request of the Government of Bangladesh (GoB) the World Bank had played the leading role for the financial assistance of FAP. The FAP included 29 different components of which 11 (Brahmaputra Right Bank strengthening, Brahmaputra Right Bank, Brahmaputra Left Bank, Ganges Right Bank, Meghna Left Bank, North East Region, Cyclone Protection project, Dhaka Town Protection, Other Town Protection, Flood Forecasting and Early warning, and Flood preparedness) were regional, with some pilot projects, and the remaining were supporting studies on the issues such as environment, geographic information system, socio-economic studies, topographic mapping, river survey, flood modeling, flood proofing, fisheries, flood response, etc. [4]. The goal of the FAP is to put the foundation of a long-term programme for obtaining a permanent and inclusive solution to the flood problem of Bangladesh.

Flood Control Drainage and Irrigation projects

To provide a greater security for crop production, flood control and drainage is used as a way for reducing the depth of flooding or control of flooding. To reduce the detrimental effect of floods and to take the advantages of surplus water for irrigation, the Bangladesh Water Development Board (BWDB) have constructed a number of dam, embankments, levee, barrages and canals (Table 4).

Flood Forecasting and Warning in Bangladesh

For flood forecasting, a network of hydrological stations connected with telemetering gauges links with the Flood Forecasting & Warning centre (FFWC) has been established by the BWDB. To enhance the disaster management capacity of national agencies and communities, FFWC generates and provides flood forecast and warning information by using the appropriate scientific principles, real-time data, weather forecast information and mathematical models. Hydrological data comprise with discharge, rainfall records and water level. Recorded historical data have been used in forecasting procedure.

Table 4: *Lists of Some Important and Major Flood Control Drainage and Irrigation Projects with their Locations.*

Name	Location
The Ganges-Kobadak Irrigation Project (G-K Project)	In the districts of Kushtia, Chuadanga, Jhenaidaha and Magura
Dhaka-Narayanganj-Demra (DND) Project	Between the cities of Dhaka and Narayanganj and bounded by the Buriganga and the Shitalakshya river
Karnafuli Multipurpose Project	In the district of Rangamati on the river Karnafuli
Tubewell Project in Northern Bangladesh	In Thakurgaon and Dinajpur districts
Brahmaputra Right Bank Embankment	On the right bank of the Tista and the Brahmaputra
Chandpur Irrigation Project	In the Chandpur and Comilla districts
Meghna-Dhonagoda Project	In Matlab upazila of Chandpur district.
Tista Barrage Project	In the districts of Rangpur, Lalmonirhat and Nilphamari
Pabna Irrigation Project	In the Pabna district
Dhaka Integrated Flood Protection Project	In the western part of Dhaka city

In case of major rivers, correlation of water levels or discharges between upstream and downstream stations is used in forecasting procedure [12]. On the other hand for rivers with smaller catchments flood routing, rainfall-runoff relation and co-axial graphical correlation methods are used. For forecasting and warning system, BWDB uses the remote sensing data along with ground data. Remote sensing data also used to delineate the flood affected areas.

Institutions Responsible for Flood Management

In Bangladesh about 53 central government organizations and 13 ministries are involved in flood and water management [13]. Of them the BWDB play leading role for flood management is the Bangladesh. Besides BWDB many other organizations are also involved in the flood management activities at different stages of flood management. Some Organizations and their corresponding responsibilities in flood management are given below:

Bangladesh Water Development Board: The activities of BWDB include feasibility Studies, implementation, operation and maintenance of flood management projects, real time data collection for flood forecasting and warning services, dissemination of flood information at national and regional levels.

Ministry of Disaster Management and Relief: Look after overall disaster management and relief and work as coordinator of all national organization regarding disaster.

Water Resources Planning Organization: It works for overall planning of water resources management.

Joint River Commission: This commission conducts negotiation for data and information exchange on Trans-boundary (India-Bangladesh-Myanmar) rivers.

Bangladesh Meteorological Department (BMD): The department forecasts long, medium and short range weather and disseminate them.

Department of Disaster Management (DDM): This department work under the Ministry of Disaster Management and Relief (MoDMR) its activities include dissemination of information for all disaster, preparedness awareness, etc.

Non-Government Organizations (NGO): Activities include flood management, Relief and Rehabilitation of flood victims.

Disaster Management and Risk Reduction Strategies of Bangladesh

Institutional Framework for Disaster Management

According to MoDMR of Bangladesh, 'disaster management means methodical institutional structure and program for disaster risk reduction and immediate response after disaster.' In Bangladesh, a series of inter-related national and sub-national levels institutions have been created for disaster management (Figure 5). As per the rules of the Government of Bangladesh, MoDMR is the key organization which is liable to develop policies, assemble plans, and monitor and coordinate all aspects of disaster activities.

The field level activities of MoDMR are conducted by two subordinate offices; (i) Department of Disaster Management (DDM) and, (ii) Cyclone Preparedness Centre (CPP). Activities of DDM include dissemination of all information on natural disasters such as flood information and warning at community level, flood preparedness, awareness raising, capacity building training, and also are accountable for conducting relief and rehabilitating actions collaborating with the district and Thana/Upazila administrations.

While CPP activities include dissemination of early warning and information of the cyclone, giving primary aid during cyclone, searching, rescuing and transferring people to the safe shelter, help in distributing relief in the asylum, etc.

Prime national level Disaster Management institutions include: NDMC; Inter-Ministerial Disaster Management Coordination Committee (IMDMCC); National Disaster Management Advisory Committee (NDMAC); National Platform for Disaster Risk Reduction (NPDRR); Earthquake Preparedness and Awareness Committee (EPAC); and Focal Point Operation Coordination Group of Disaster Management (FPOCG) [9]. The National Disaster Management Advisory Council (NDMAC) and Inter-Ministerial Disaster Management Coordination

Committee (IMDMCC) are accountable for coordinating all disaster related activities at the national level. District, Thana and Union Disaster Management Committees shall coordinate at the respective District, Thana/Upazilla and Union. The Disaster Management Bureau helps them in the whole process. A series of inter-related national and sub-national institutions have been worked to ensure coordination of disaster risk reduction, effective planning and quick emergency response.

Disaster Management Regulative Framework

To manage the pattern of disaster management, a disaster management regulative framework has been established which is accountable for implementation of the Bangladesh Disaster Management Frame work (Figure 6). The activities of Ministries, Departments, NGOs and civil society are undertaken by this regulative frame work. The regulative framework delivers the pertinent legislative, plan and policy, and best practice framework. The activities of Disaster Risk Reduction and Emergency Response Management in Bangladesh is supervised and implemented by this framework. The regulative framework is consists of Disaster Management Act, Disaster Management (DM) policy, National Plan for Disaster management and Standing Orders on Disaster (SOD) (Figure 6).

Disaster Management Act

The act (Act no 34) was issued by the Government of the People's Republic of Bangladesh on 24 September 2012. The act is comprised of six chapters (Preamble, Organizational Structure of Disaster Management, Disaster zone declaration, participation of different forces, etc., Disaster Management Fund, Relief vault, etc., Offense, punishment, etc., Miscellaneous) and under these six chapters there are 60 sections. For explanation, there are some clauses under each section.

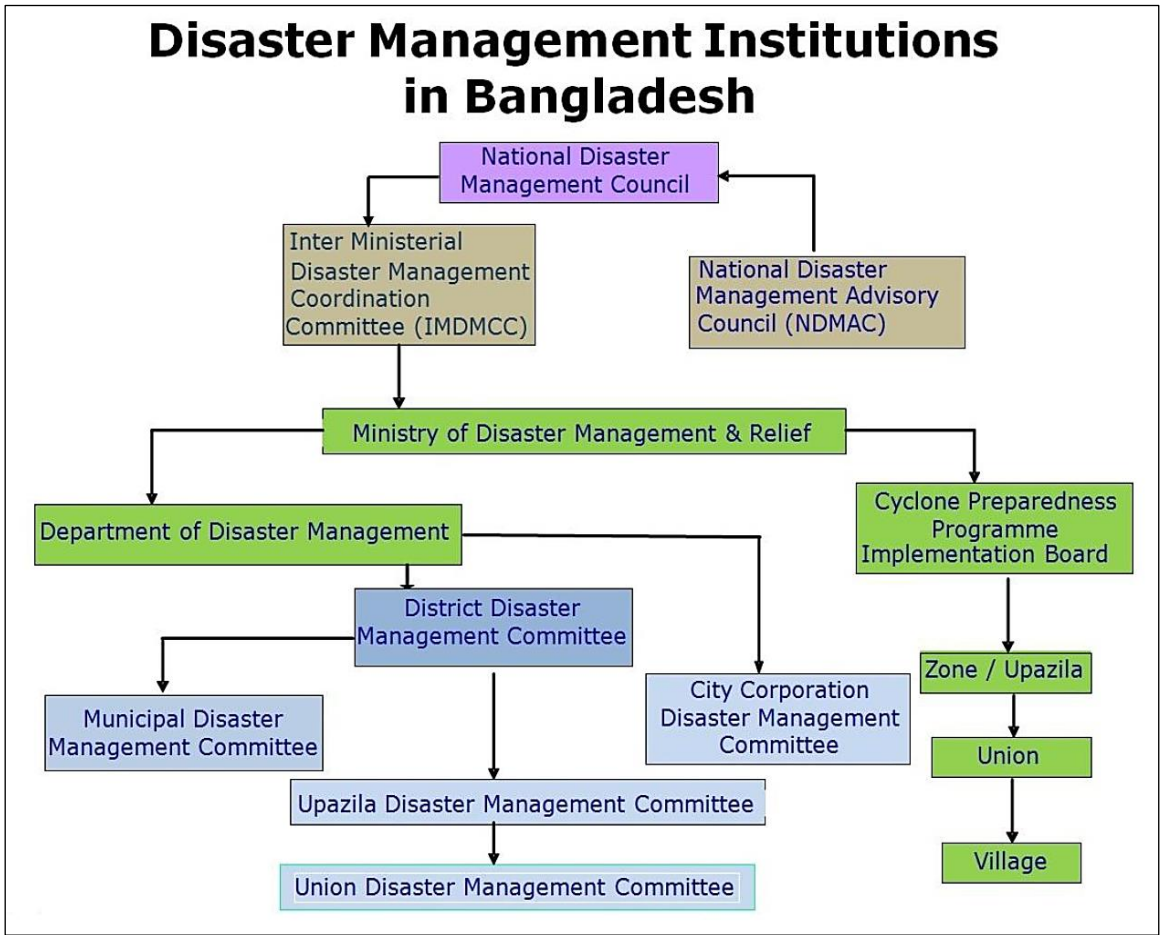

Fig. 5: *Disaster Management Institutional Framework of Bangladesh. Source. ADRC.*

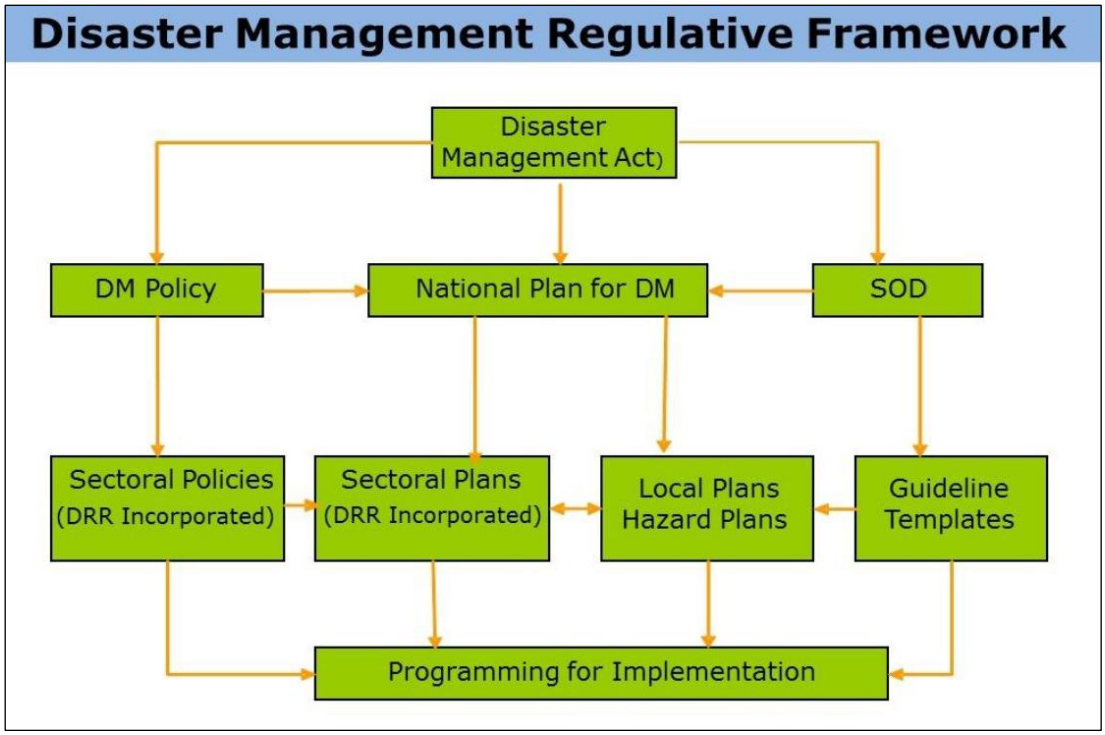

Fig. 6: *Disaster Management Regulative framework of Bangladesh. Source ADRC.*

In 2012, the disaster management act was enacted to make the activities about disaster management coordinated, object oriented and strengthened and to formulate rules to build up infrastructure of effective disaster management to fight all types of disaster [14]. The Disaster Management Act created as the tools of legislative framework under which disaster risk reduction and emergency management operations are undertaken in Bangladesh, and providing the legal basis under which activities and actions are identified and managed [15]. It also regulates the mandatory rules and responsibilities of Ministries, committees and appointments.

National Disaster Management Policy (NDMP)
The National Disaster Management Policy has been introduced to define the national approach on disaster risk reduction and emergency response management. It also describes the strategic policy framework, national principles, broad national objectives and strategies of disaster management in Bangladesh.

National Plan for Disaster Management (NPDM)
The National Plan for Disaster Management (NPDM 2010–2015) was the first policy document prepared by Ministry of Food and Disaster Management. NPDM 2010–2015 reflected a paradigm shift from disaster relief and response to a comprehensive risk reduction culture, with emphasis on capacity strengthening, helped to achieve several milestones leading to the Disaster Management Act (2012) [9]. The NPDM 2010–2015 was worn from regional and international frameworks including the SAARC Disaster Management Framework and the Hyogo Framework of Action (HFA).

A evaluation of NPDM 2010–2015 indicated the need to focus on the following issues: urban disasters; capacity strengthening at district and Upazila administrations; resourcing for DM plan implementation; integration of gender; information management; synergy between DRR and climate change adaptation plans; monitoring; coordination and command system; user-friendly planning; and proactive dissemination [9]. Thus, it becomes necessary to issue NPDM 2016–2020 and thus it was published in March 27, 2017. The NPDM 2016–2020 is prepared under the guidance of MoDMR and is aligned with national, regional and global frameworks including: Vision 2021, which is concerned with protection from climate

change and environmental impacts, and ecological development; the Government of Bangladesh 7th 5-year plan regarding to the overall goal of DM in Bangladesh to build resilience and corresponding identification of national resources; Asia Regional Plan for Implementation of the Sendai Framework for Disaster Risk Reduction and Sendai Framework for Disaster Risk Reduction (SFDRR), which is integrated into the objectives GoB's 7th five year plan; Bangladesh Climate Change Strategic Action Plan (BCCSAP), Paris Climate Change Agreement, providing Bangladesh the opportunity to leapfrog into a sustainable future by investing on renewable energy; and Sustainable Development Goals (SDGs),where DRR is the foundation and allows safeguarding development efforts from disasters [9]. The main objectives of the NPDM 2016–2020 is to guide implementation of the Disaster Management Act 2012, allowing ministries of the government and other organizations to use it to make their annual work plans. In NPDM 2016–2020 social and cross cutting strategy are included and informed all disaster management initiatives, policies, programs and planning: To ensure inclusion of gender issues in decision making and involvement of men and women in all NPDM 2016–2020 priority actions; To ensure sufficient considerations for people with vulnerabilities across implementation of NPDM 2016–2020 [9].

Standing Orders on Disaster (SOD)

The SOD outlines the disaster management systems in Bangladesh and describe in detail the roles and responsibilities of different committees, Ministries, Departments and all other organizations involved in disaster risk reduction and emergency response management. It also established the essential actions that are required in implementing Bangladesh's Disaster Management Model such as to defining the risk environment, managing the risk environment and responding to the hazardous environment [15].

Involvement with Different International Organizations and Frameworks

Co-operations

- UNISDR, United Nations Office for Disaster Risk Reduction
- UNHCR, United Nations Office of the High Commissioner for Refugees
- UNOCHA, United Nations Office for the Coordination of Humanitarian Assistance
- WFP, World Food Programme
- UNFPA, United Nations Population Fund
- FAO, Food and Agriculture Organization
- ADRC, Asian Disaster Reduction Center
- ADPC, Asian Disaster Preparedness Center
- ESCAP, Economic & Social Commission for Asia and the Pacific
- INSARAG, International Search and Rescue Advisory Group
- RIMES, Regional Integrated Multi-Hazard Early Warning System
- IFRC, International Federation of Red Cross
- Handicap International & Save the Children

Frameworks

- HFA, Hyogo Framework For Action
- SAARC, South Asian Association for Regional Cooperation
- UNFCCC, UN Framework Convention on Climate Change
- MDG, Millennium Development Goals
- SDG, Sustainable Development Goals
- SFDRR, Sendai Framework for Disaster Risk Reduction

CONCLUSION

The paper clearly presented that the country is highly disaster prone and faces a lot of natural hazards. There are many natural hazards that makes the country highly vulnerable to disaster includes flood, earthquake, landslide, drought and epidemics. Since 1972, total 297 natural disasters occurred in Bangladesh by which 229521 people have died and 396316766 people have been affected. Rapid urbanization, densely population, geographical features, excessive rivers, poor economy, climate change are the main contributing factors of natural hazards. From the analysis of the profile, it was also found that flood is one of the most common and frequent natural disasters in Bangladesh. Last 46 years Bangladesh experienced total 86 floods and this is about 29% of the total natural disasters. During this period flood killed 42279 people and affected another 396,3167,66 people. So it

can be easily said flood is the devastating natural disaster in Bangladesh. There are many underlying factors are liable for flood in Bangladesh includes excessive rivers and river systems, huge floodplain, heavy rainfall in the catchment area of the rivers, water flow from the rivers of India and Myanmar, general low topography, snow-melt in the Himalayas, human intervention of the environments. For disaster management and risk reduction, the country has an institutional, regulative and legislative framework. In Bangladesh, MoDMR is playing the leading role for disaster management and risk reduction. Disaster flood is specially deal by BWDB with the MoDMR and other ministries and organization. They have taken different initiative for flood management and reducing risks include flood action plan, flood management model study, flood hydrology study, flood early warning study, national water policy national water management plan, and construction of flood embankments and flood shelters. Bangladesh is now in transitional moment, recently the country has overcome the threshold of lower middle income country and trying to reach middle income country within 2021 and for that GoB announced 'vision 2021' where priority is given to the disaster management and risk reduction. With other national and international stakeholders, the country has taken several steps to become resilience to disasters. But for reducing the vulnerability of disaster people of Bangladesh need to be more aware, informative and conscious about different hazards. The GoB need to be increased more budget and given more concentration to this sector for the country's development and to reach its 'vision 2021'.

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